Title: Advanced Design Concepts for a SeaWinds Scatterometer Follow-On Mission
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ABSTRACT

In June, 1999 the first NASA SeaWinds wind scatterometer radar was successfully launched aboard the QuikSCAT spacecraft. The wind data derived from the SeaWinds on QuikSCAT instrument has contributed significantly to the scientific study of air/sea interactions and global climate phenomena such as El Niño. This data set is also being increasingly used by the meteorological community to improve the fidelity of weather forecasts. A second SeaWinds instrument is scheduled for launch aboard the Japanese ADEOS-II spacecraft in November, 2001. This series of scatterometer missions will guarantee a continuous flow of Ku-Band wind data through the 2004-5 time frame.

To extend the Ku-Band scatterometer database to the year 2010, a SeaWinds follow-on mission is under consideration. The planned follow-on design utilizes the same scanning pencil-beam architecture adopted for SeaWinds, but includes additional features to make it more capable, lighter, and less expensive. This paper describes the design efforts for the SeaWinds follow-on system.

While maintaining the capability of making high quality co-polarized backscatter measurements, the planned SeaWinds follow-on will include an additional polarimetric capability. The polarimetric scatterometer measurements will significantly enhance the wind retrieval accuracy and effectively increase the swath width beyond what is achievable by the current SeaWinds design. Once demonstrated, the addition of the polarimetric function has the potential of reducing the stringent 360 degree field-of-view requirements inherent to current scatterometer systems. It will be shown that the polarimetric capability will be implemented with a set of straightforward, low-risk modifications to the existing SeaWinds design. The SeaWinds follow-on concept also includes an improved capability to detect when surface wind measurements have been contaminated by rain.

In addition to enhancing measurement capabilities, the SeaWinds follow-on design effort also focuses on the development of an instrument which is easier to accommodate on candidate spacecraft (i.e., is lighter and smaller) and is less expensive to fabricate, test, calibrate, and operate. A key component in this strategy is an increased emphasis on relatively inexpensive post-launch calibration techniques to obtain the final calibration parameters. By utilizing distributed Earth targets, the overall instrument response can be calibrated to an extremely high accuracy (0.2 dB relative accuracy). This approach has been extensively validated by an analysis of the SeaWinds data returned from QuikSCAT.